

Preliminary Draft Action Plan for the Energy Chapter

INTRODUCTION TO THE ACTION PLAN

The energy action plan identifies policy and practice that Southern California Association of Governments (SCAG) endorses for external parties and itself. While the actions included here are advisory, SCAG will refer to its recommended practices in administering Inter-Governmental Review as authorized by CEQA. The action plan includes items identified as mitigation in the Program Environmental Impact Report for the 2004 Regional Transportation Plan (RTP).

The action plan, as with other RCP chapters, is organized according to the implementing party. As such, there is a recommended actions section for the Federal Government, State Government, SCAG and other regional agencies, and local governments.

California's recent energy crisis brought energy to the forefront of public policy issues. These issues can be summarized as 1) meeting the immediate energy demands, and 2) planning and developing the energy infrastructure necessary for servicing future population growth and energy requirements.

Meeting immediate demands is problematic in that existing supply and demand for petroleum is resulting in significantly high retail prices. In addition, in 2000, there were electricity price spikes and rolling blackouts. Energy conservation provides the most immediate benefit at the regional/local level.

Meeting future needs will be challenging. The energy needs necessary to serve the additional six million people forecast for the region will be substantial. This is especially true if high-energy projects are implemented, such as Magnetic Levitation High Speed Rail (Maglev) trains and seawater desalinization plants.

In 2004, SCAG's Regional Council created a clear set of objectives and goals related to the future growth of the region and formalized them in the Compass Growth Vision and the Regional Transportation Plan. The growth vision calls for accelerated growth in key strategic areas that are beneficial to energy conservation, such as transit oriented development along major corridors. The vision for future growth and development is described in full in the Land Use and Housing Chapter of this plan.

This chapter presents energy policies adopted by the SCAG's Regional Council and are referenced in the action plan and are appended as well. It also contains data on electricity, natural gas, and petroleum fuel production and consumption for the SCAG region and the state.

The Indicators Section includes performance indicators to show how the region is progressing toward its policy goals and relates the region's progress on energy issues to the Regional Council's Growth Vision principles:

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- Improve **mobility** for all residents
- Foster **livability** in all communities
- Enable **prosperity** for all people
- Promote **sustainability** for future generations

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SCAG POLICIES REGARDING ENERGY

[Please note: An asterisk * identifies items moved for inclusion by the Energy And Environment Committee (EEC). These items have not been approved by the SCAG Regional Council.]

The SCAG Regional Council, through resolutions and adoption of major planning and policy documents, has established policies regarding energy. The overarching policy for energy is one of sustainability. The Regional Council, through its 2004 Growth Vision, recognizes that energy production and consumption must be sustainable in order to manage natural resources efficiently and in order to protect the environment today and in the future. The overarching energy policy is to:

Energy Policy 1: Develop strategies to accommodate growth that use resources efficiently, eliminate pollution, and significantly reduce waste. - SCAG Growth Vision, Policy 72

To reduce the overall consumption of fossil fuels, particularly petroleum, SCAG policies encourage the use of alternative fuel vehicles and transit:

Energy Policy 2: Encourage local jurisdictions to purchase alternative fuel vehicles, support the installation of refueling infrastructure, planning, education, and outreach to promote alternative fuel vehicles, support the development of legislation, programs, funding, and technology which addresses clean fleets and alternative fuels. - SCAG Resolution 145

Energy Policy 3: Encourage investment in transit. – SCAG Growth Vision, Policy 72

SCAG enacted policies to show their support for clean energy generation in an effort to develop sustainable energy generation and to develop the power plants in an environmentally sustainable way.

Energy Policy 4: Oppose current power plant projects at the US-Mexico border, until California Best Available Control Technologies are installed and maintained on all power plants along the border. - SCAG Resolution 144

Energy Policy 5: Support only the use of the best available technology including monitoring, air, and water impacts for locating any nuclear waste facility. – SCAG Resolution 148

SCAG is required to implement the mitigation measures listed in its Mitigation, Monitoring, and Reporting Program of the 2004 Regional Transportation Plan (RTP) Program Environmental Impact Report (PEIR). The mitigation measures are part of the Action Plan. Mitigation measures addressing energy include:

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Energy Policy 6: *Work with local jurisdictions and energy providers, through [SCAG's] Energy and Environment Committee and other means, to encourage regional-scale planning for improved energy management. Future impacts to energy shall be minimized through cooperative planning and information sharing within the SCAG region. This cooperative planning shall occur during the update of the Energy chapter of SCAG's Regional Comprehensive Plan and Guide. – SCAG EIR Policy 172*

Energy Policy 7: *Encourage state and federal lawmakers and regulatory agencies to pursue the design of programs to either require or incentivize the expanded availability and use of alternative-fuel vehicles to reduce the impact of shifts in petroleum fuel supply and price. – SCAG EIR Policy 171*

In reviewing SCAG energy policies as part of the 2004 Regional Comprehensive Plan development, the RCP Task Force noted that SCAG lacked an energy generation policy. Because of the region's forecasted population growth, new sources for power will be necessary and will require additional delivery infrastructure. At a workshop on Regional Energy Policy on April 29, 2005, attendees recommended several policies and resolutions. On July 7, 2005, the EEC approved the proposed policies below. These policies have not been approved by the SCAG Regional Council.

Energy Policy 8: *Encourage cost-effective alternative and renewable energy generation facilities **

Energy Policy 9: *Encourage reliable energy through the diversification of sources **

Energy Policy 10: *Encourage cogeneration, where feasible and cost-effective. **

Energy Policy 11: *Encourage greater coordination between the California Public Utilities Commission and Independent Service Operator. **

Energy Policy 12: *Encourage increasing capacity of existing transmission lines, where feasible. **

SCAG has no adopted policy on energy conservation. There are policies related to air quality and transportation that have the same effect as conservation, as it relates to congestion mitigation, (Policy Reference: RTP 14, 15, 16, 17, 18, 19, 20, 21, 22, 23) but not static energy usage (lighting, heating, etc.). However, energy conservation policy will continue to be addressed through the RCP planning process. This process will include input from various energy stakeholders through the proposed Energy Working Group. Currently, one energy conservation policy has been recommended during the workshop on Regional Energy Policy on April 29, 2005 and subsequently approved by the EEC on July 7, 2005.

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***Energy Policy 13:** Encourage the public and private sectors to use energy efficient materials in building design, construction, rehabilitation and retrofit. **

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RECOMMENDED ACTIONS

Actions for the Federal Government

Transportation fuels

- Promote Federal legislation/regulations promoting increased vehicle fuel efficiency standards.
- Maintain or increase funding for HOV lanes and promotion of carpooling.
- Encourage elected officials to actively promote carpooling
- Increase the funding available for transit programs under the Highway Trust Fund.
- Develop a national consensus on alternative fuel research and development.
- Provide incentives for local units of Federal agencies to adopt alternative vehicle fleets to promote alternative fuel infrastructure development.

(Policy Reference: 1996 RCP EIR 171; Growth Vision 79, Resolution 145)

Energy efficiency

- Promote tax incentives for the commercial/domestic alternative energy generation, such as solar power and wind turbines. (Policy Reference: Growth Vision 72)

Actions for the State Legislature

Alternative and renewable energy generation

- Maintain and expand Solar Energy Rebate Program
- Promote Solar Energy Technology development
- Promote wind generation technology development
- Provide incentives to increase the use of cogeneration technologies.

Alternative fuel incentives and research

- Provide incentives for state and local governmental bodies to adopt alternative vehicle fleets.
- Adopt alternative fueled vehicles for government fleet cars throughout the nation.
- Maintain and expand incentives for populace to purchase and use alternative fuel vehicles (e.g. carpool lane usage)
- Provide preferred "Reserved for Alternative Fuel Vehicle" parking locations at state buildings.

(Policy Reference: EIR 171, Resolution 145)

Fuel conservation and transit

- Promote public awareness campaigns on carpooling and transit ridership
- Promote preferred parking spaces for carpools at State office buildings
- Provide subsidies for carpooling and transit ridership
- Promote public awareness campaigns on carpooling and transit ridership

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- Incorporate schools into the “Flex Your Power” public awareness program. (Policy Reference 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 79, RTP, Growth Vision)

Energy conservation purchases

- Provide state tax rebates to low income households (and landlords for low-income housing) who purchase efficient appliances.
- Provide informational items promoting the California Home Energy Efficiency Rating System (CHEERS)

Green building

- Require new government buildings be built according to a minimum threshold on the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.
- Require minimum LEED standards for all commercial/residential building construction.
- Advocate the use of natural cover (roof top trees/shrubs) to reduce urban heat sink phenomenon.

(Policy Reference: Growth Vision)

Actions for SCAG

Incentives for commercial and residential energy conservation purchases

- Provide state tax rebates to low income households (and landlords for low-income housing) who purchase efficient appliances.
- Provide informational items promoting the California Home Energy Efficiency Rating System (CHEERS)
- Require new government buildings be built according to a minimum threshold on the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.
- Require minimum LEED standards for all commercial/residential building construction.
- Advocate the use of natural cover (roof top trees/shrubs) to reduce urban heat sink phenomenon.

(Policy Reference: RCP 13)

Energy generation

- Encourage reliable energy through a variety of sources
- Encourage future new power generation be renewable to the greatest extent possible

Fuel conservation and transit

- Advocate for greater vehicle occupancy
- Advocate for dedicated preferred designated parking for carpools at government buildings and businesses.
- Promote public awareness campaigns on carpooling and transit ridership

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- Promote preferred parking spaces for carpools at regional office buildings
 - Promote public awareness campaigns on carpooling and transit ridership
 - Advocate and plan for regional transit solutions to transportation problems
- (Policy Reference: Growth Vision 72, 79)

Alternative fuel incentives and research

- Promote the use of alternative fuel vehicles.
- Advocate that local governments allow electric/alternative fuel vehicles to park at metered parking spots at no charge (any applicable time limitation would still apply). (Policy Reference: EIR 171)

Cooperation and coordination

- Regional Planning Agencies work with California Energy Commission to develop energy demand and supply forecasting methodology.
- Distinguish energy generation and consumption for the built environment and that for transportation purposes.
- Develop data on the implications of energy usage, especially on emissions of toxic air contaminants and greenhouse gases and possibly for other environmental issues, such as water quality.
- Support state and local efforts to better coordinate demand side management programs and the development of overall energy policies and goals.
- Develop regional energy performance indicators and goals for those indicators.
- Investigate the potential benefits to the region from encouraging distributed energy resources and combined heat, cooling, and power.
- Regional agencies monitor and provide input towards development of State energy projections.

(Policy Reference: EIR 172)

Actions for Counties and Cities

The following are advisable actions or tools for use in all jurisdictions:

General Considerations

Public Awareness Campaigns

- Local governments develop Public Awareness campaign strategies customized to their local communities.
- Local, regional and state agencies coordinate public awareness campaigns for maximum effectiveness.
- Provide Public Awareness campaign for California Home Energy Efficiency Rating System.
- Promote public awareness campaigns on carpooling and transit ridership.

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Policy Actions

SCAG's 2% Strategy

SCAG's Compass Growth Vision program has identified 2% of the land in the SCAG region to focus land use and transportation investments in order to accommodate the forecast growth in the region to the year 2030. Governments can review this "2% Strategy" and ensure that energy policy is implemented in the areas of the 2% Strategy that fall within their jurisdictions. SCAG can promote the 2% Strategy to educate jurisdictions about the strategy and about ways to implement the strategy, at the same time incorporating energy policy into their plans. (Policy Reference: Growth Vision 159, 160, 161)

Telecommuting

Local governments can encourage telecommuting by adopting telecommuting programs for their employees, allowing or encouraging local telecommuting centers through their general plan and land use regulations, and allowing or encouraging people to work at home through their home occupations ordinances. State and regional agencies can help implement telecommuting through information campaigns and by providing opportunities for their employees to telecommute. More specific implementation ideas include the provision of credits to employers subject to telecommuting provisions of a trip reduction ordinance and the organization of forums and workshops for local employers to explain the benefits of telecommuting.

- Local governments/local businesses should adopt telecommuting programs for employees.
- Local businesses can create "business kiosks" in areas where market demand exists for telecommuters to work and hold meetings.

Planning Actions

State Energy Supply Planning

Regional and local governments could take a more active role in the statewide energy planning process. Regional and local governments should monitor the development of the State energy projections. (Policy Reference: EIR 172)

- Regional/Local governments should participate in the statewide energy planning process
- If unable to participate, Regional/Local governments should monitor and comment on the development of state energy plans and projections.

Street Grids and Building Alignments

Land use can encourage the use of solar energy. New streets can be aligned to best utilize the energy provided by the sun. In turn, the position of new buildings on the street and the position of windows on a building can be aligned to maximize natural lighting.

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- New development designs should encourage use of natural lighting and energy efficiency.

Transit and Land Use Emphasis

There is potential for energy savings from increased transit facilities within a pattern of compact, mixed use, transit oriented development. A range of public agencies should implement this measure. SCAG's 2% Strategy encourages growth around transit stations, and advocates for easy access to the stops and stations. Related implementation strategies include coordination with transit agencies to pursue joint development projects, including housing, adjacent to transit; provision of zoning incentives, including density bonuses; and adoption of specific plans around rail stations and transit centers.

- Local governments should encourage transit oriented development

Environmental Actions

Energy Efficient Landscaping and Design

- Local governments should review and update, as necessary, building retrofit ordinances for energy efficiency. (Policy Reference: RCPG 87, EIR 172)
- Local governments continue to provide incentives for commercial and residential energy conservation purchases.
- Provide incentives to low income households (and landlords for low-income housing) who purchase efficient appliances.
- Provide informational items promoting the California Home Energy Efficiency Rating System (CHEERS)
- Require new government buildings be built according to a minimum threshold on the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.
- Require minimum LEED standards for all commercial/residential building construction.
- Advocate the use of natural cover (roof top trees/shrubs) to reduce urban heat sink phenomenon where practical.
- Encourage local jurisdictions to adopt green building guidelines.
- Local governments develop conservation guidelines for new construction.
- Local governments develop conservation manuals for homeowners and local landscape contractors/architects.
- Building industry develops guidelines for energy efficient landscaping in new construction.

Increased Vehicle Occupancy

All levels of government can contribute to the implementation of this action. Local governments can encourage carpool and vanpool programs and adopt trip reduction ordinances. While many of the needed programs are in place, a local jurisdiction can enhance effectiveness by helping fund information and promotion campaigns, and

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construct preferential parking, among other items. Regional and state transportation agencies can provide for HOV lanes between communities. All levels of government can conduct public awareness campaigns to encourage increased vehicle occupancy.

- Local governments/local businesses dedicate preferred designated parking for carpools.
- Promote public awareness campaigns on carpooling and transit ridership.

Alternative Fuels

- Local governments work with SCAG and other governmental units to establish standards on alternative fuel technology and infrastructure.
- Local governments purchase alternative fuel vehicles for their fleet, where practical.
- Local governments develop a common infrastructure necessary to support alternative fuel vehicles.

Energy Scorecards and Best Practices Lists

Governments can set thresholds for energy efficiency and energy savings through energy scorecards. Similar to the energy scorecards, government agencies can develop energy checklists for developers that detail best practices that can be taken to build energy efficient products.

- Promote development regulations and design standards to maximize energy efficiency and minimize potential health risks.

Wind Power Resources

Municipalities or municipal agencies can decide to purchase wind energy for City or County operations, where feasible and economical. In addition, developing wind power resources may benefit the local economy through jobs, lower electricity costs, and leasing revenues, while enhancing a community's energy independence.

- Explore wind purchasing to power City or County operations where feasible and cost-effective.
- Explore the development of local wind power resources, where feasible and cost-effective.

Regulatory Actions

Pedestrian and Bicycle Emphasis

Local governments could require an integrated system of pedestrian and bicycle paths, bike storage facilities, and shower facilities. More compact land use patterns, especially involving mixed uses, would also assist in this action. Although local governments assume primary power to implement this measure, regional agencies, especially those responsible for transportation and air quality, could encourage local governments to adopt programs that support bicycle ridership and pedestrians. Regional agencies also could

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coordinate the efforts of cities and counties to assure a regional system. To assist in the implementation of the measure, the following strategies could be considered:

- appointment of a bicycle/pedestrian coordinator or advocate,
- amendment of subdivision ordinances to require pathways and/or a system of paths,
- development and distribution of regional maps that clearly illustrate bicycle and pedestrian systems.
- Local governments should encourage the incorporation of bicycle/pedestrian paths in new development areas through incentives or regulations.
- Local governments should encourage the use of pedestrian friendly designs in new construction and urban redevelopment
- Regional agencies should work with local governments to coordinate and integrate a region wide bicycle path system.

Finance Actions Data and Analysis Actions/Tools

Congestion Pricing

This action charges a toll to use certain roads during certain parts of the day. The tolls are usually imposed in central business districts. The most prominent example of congestion pricing is in downtown London in the United Kingdom. Tolls will produce side effects that must be understood by all agencies in advance of their imposition. The tolls can be imposed by the state or by operators of private roads or bridges.

- Regional/local governments should examine the use of congestion pricing in heavily congested central business districts.

Parking Pricing

- Allow electric vehicles to park at metered parking spots at no charge (time limitations would still apply).
- Local governments establish a formula for the maximum number of parking spaces for each square foot of office space.
- Local businesses can establish peak hour parking pricing.
- Local businesses can establish higher short term parking rates (subsidized by validation from local retailers).
- Local governments/local businesses can provide reduced parking fees for carpools.

CROSS REFERENCE

Many actions related to energy are also included in the Land Use, Water, Air Quality, Open Space, and Transportation Chapters. Communities are encouraged to examine these other action plans for additional guidance.

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Southern California Gas Company. (September 15, 2005) Southern California Gas Report 2005.

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CURRENT CONDITIONS

Energy price increases and rolling blackouts in 2000 caught many off guard about the seriousness of the state's energy supply issues. In 1996, the state legislature passed Assembly Bill (AB) 1890, restructuring the electricity market. Initially, the market appeared to function well, but by 2000, electricity demand in the state began to catch up with supply. This increased demand, combined with other factors, resulted in price spikes and rolling blackouts. Even after some reforms, current electricity reserves will be insufficient to meet an abnormally hot summer (considered once every ten years).¹

Another energy planning challenge is to consider the context of regional growth visioning. The addition of six million new residents by 2030 will result in increased land-use development and its associated energy demands. The increasing use of electronics in business, home and personal entertainment devices will place new demands on the capacity, demand and distribution of energy in the SCAG region.

Government activities to support the 2030 population projections will also increase energy demand. The use of Magnetic Levitation technology for high speed rail will increase electrical demand. The use of desalinization plants to provide potable water to residents will also require additional energy resources. Although the Department of Water Resources report, Water Desalination Findings and Recommendations found that energy generation capacity would not be a constraint to implementation of currently proposed desalination projects, the economic viability of seawater desalination would be dependent on the availability of low-cost power.²

Energy planning for 2030 will be challenging. As a by-product of market restructuring, less energy data is available and less planning is performed, since in theory, market forces will "plan" our energy requirements. Before AB 1890, the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC) collaborated in forecasting power demand and supply. The process is now different, and the CEC forecasts only 10-12 years into the future, despite the fact that oftentimes energy infrastructure takes longer to plan and develop. Investor-owned utilities also scaled back their energy forecasting efforts, though they still conduct business planning on various time horizons.

In addition, California imports 34% of the petroleum that is processed in its refineries from foreign countries. Continued oil price fluctuation has helped to bring forward concerns about American dependence on petroleum and has renewed national and state interest on energy policy.

¹ California Energy Commission, Summer 2005 Supply-Demand Update, Joint Agency Meeting, March 23, 2005, http://www.energy.ca.gov/energy_action_plan/meetings/2005-03-23_meeting/2005-03-23_ASHUCKIAN.PDF accessed June 13, 2005.

² California Department of Water Resources, Water Desalination - Findings and Recommendations, October 2003.

Energy Sources

Electricity is produced in several different ways. Natural gas is used to produce electricity as well as to heat homes and water. Petroleum (oil) consumption in California is used primarily for transportation purposes. Various types of renewable energy production are in use and are being further developed to meet more of the state's energy demand. This section describes current energy consumption patterns in the SCAG region and the state.

Electricity

Natural gas is used to supply the largest percentage of electricity in California. Combined with natural gas, the energy sources of coal, large hydrologic systems, and nuclear power provide 90% of the energy to make electricity in the state. Only 10% of electricity in the state comes from renewable energy sources such as geothermal, biomass, small hydrologic projects, wind, and solar sources. Power generation by type can be seen in Table 1, below:

Table 1: California Gross System Power for 2004 (In Gigawatt-Hours)					
Fuel Type	In-State	Northwest Imports	Southwest Imports	Gross System Power (GSP)	GSP Percentage
Natural Gas	104,858	1,926	8,400	115,184	41.90%
Coal	28,589	5,154	20,760	54,503	19.80%
Large Hydro	29,667	9,560	1,445	40,672	14.80%
Nuclear	30,241	786	4,467	35,494	12.90%
Renewables	29,238	-0-	-0-	29,238	10.60%
Geothermal	13,571			13,571	4.90%
Biomass	5,997			5,997	2.20%
Small Hydro	4,669			4,669	1.70%
Wind	4,258			4,258	1.50%
Solar	743			743	0.30%
TOTAL	251,831	17,426	35,072	304,329	100.00%
Source: California Energy Commission. 2004 Net System Power Calculation Report, Energy Commission Publication # CEC-300-2005-004. Accessed September 7, 2005, from http://www.energy.ca.gov/electricity/gross_system_power.html					

The Southern California Edison Company delivers 69% of the retail electricity sales to residents and businesses in the SCAG region. The Los Angeles Department of Water and Power (LADWP) delivers 20% of the region's electricity, and a number of small municipal utilities deliver the remaining 11% of the electricity.³

Different sectors of the economy use different amounts of electricity. Based on 2004 demand, the commercial sector uses the most electricity in California (37%), followed by the residential (31%) and then the industrial sector (16%). Agricultural, mining, and other users account for 16% of the electricity consumed in the state.⁴

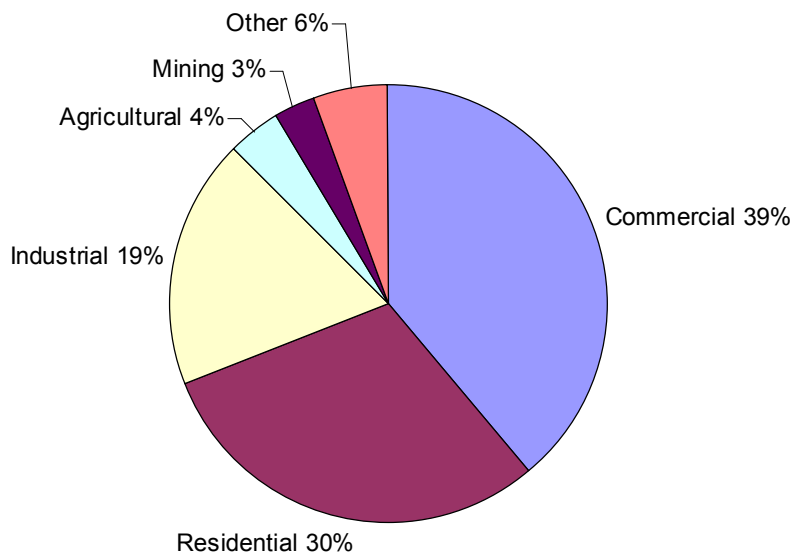
³ Source: *California 2001 Electric Utility Retail Deliveries*. Updated March 25, 2003. http://www.energy.ca.gov/electricity/utility_electric_sales_2001.xls accessed December 15, 2005.

⁴ Source: California Energy Commission. (September 2005). *California Energy Demand 2006-2016 Staff Energy Demand Forecast*.

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The SCAG region consumed 46% of the electricity in the state in 2004. The percentage of consumption by individual sectors follows the same pattern as the state. Commercial, residential, and industrial users consume 88% of the electricity in the region, with the remaining 14% consumed by agricultural, mining, or other uses.⁵ The following pie chart shows the distribution of electricity consumption, by sector, for the SCAG region in 2004.

Percentage of Electricity Consumption by Sector, SCAG Region, 2004



Natural Gas

Natural gas supply and demand data are compiled by the state's natural gas utilities in the annual California Gas Report. The SCAG region is served primarily by the investor-owned Southern California Gas Company, a unit of Sempra Energy. A small portion of the region is served by a municipal gas utility, Long Beach Energy (part of the City of Long Beach).

Californians consumed approximately 6 billion cubic feet per day of natural gas in 2004.⁶ California produced only 13% of this daily amount, leaving the state to rely on other sources to meet the large majority of the state's needs. Imports came from the Southwestern United States (39%), Canada (24%), and the Rocky Mountain region of the United States (25%). Since 1994, California began to rely on natural gas from Canada and the Rocky Mountains region and has seen both the physical amount and the percentage produced within California as well as imported from the Southwest decrease.

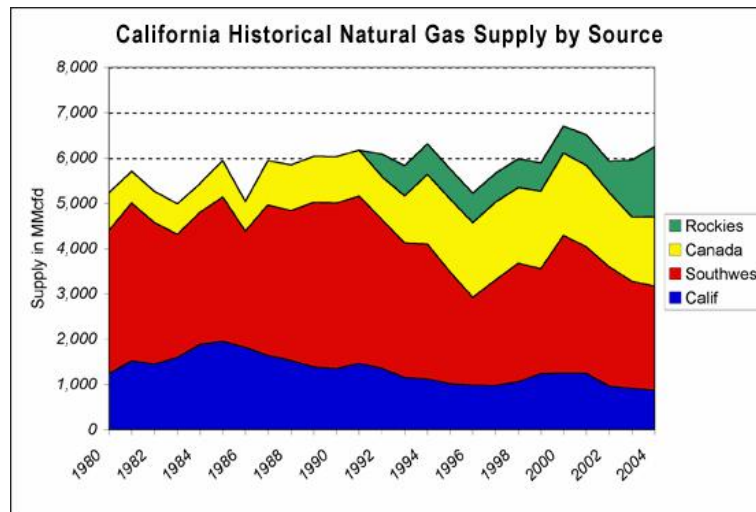
⁵ Source: California Energy Commission. (September 2005). *California Energy Demand 2006-2016 Staff Energy Demand Forecast*.

⁶ California Energy Commission, Natural Gas Statistics, <http://www.energy.ca.gov/naturalgas/statistics>, accessed November 30, 2005.

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In 2004, offshore production accounted for 11% of California's total gas production.⁷ Total natural gas demand in California is projected to increase by 0.7% per year from 2006 to 2016, with strong growth in the residential and commercial sectors offset by declining industrial gas demand and slower growth in gas consumption by power generators than has been observed in recent years.⁸

California Natural Gas Supply By Source (In MMcfd - Millions of Cubic Feet / Day)



Notes: California is net California on and offshore production.

Southwest is natural gas delivered to California by El Paso Natural Gas Company, Mojave Pipeline Company, Transwestern Pipeline Company, and Southern Trails Pipeline Company.

Canada is natural gas delivered to California by Pacific Gas Transmission Company.

Rockies is natural gas delivered to California by Kern River Transportation System.

Source: California Gas Reports, FERC Form 2, QFER Form 6a and 10a, California Department of Conservation Division of Oil and Gas - Annual Report of the State Oil and Gas Supervisor Accessed September 6, 2005, from http://www.energy.ca.gov/naturalgas/statistics/gas_supply_by_source.html

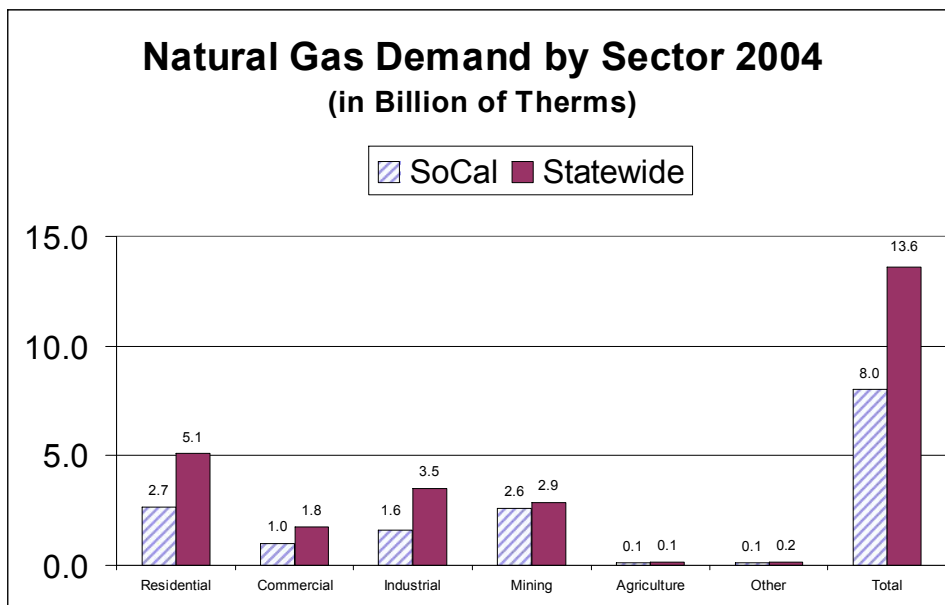
The most recent data (as shown in the below chart) show that the residential sector uses the largest amount of natural gas, both across the state and in the SCAG region. The SCG planning area is comprised of the SCE, BGP, and LADWP electric planning areas. It includes customers of those utilities, plus customers of private marketers using the SCG natural gas distribution system. In 2004, the mining sector was second in the amount of natural gas consumed in the SCAG region. Statewide, the industrial sector was second in the amount of natural gas consumed. The commercial sector falls behind residential, mining, and industrial uses in natural gas consumption in the SCAG region and statewide. The agricultural sector accounts for only 1% of the natural gas use statewide and in the SCAG region.⁹

⁷ California Energy Commission, Natural Gas Statistics, <http://www.energy.ca.gov/naturalgas/statistics>, accessed November 30, 2005.

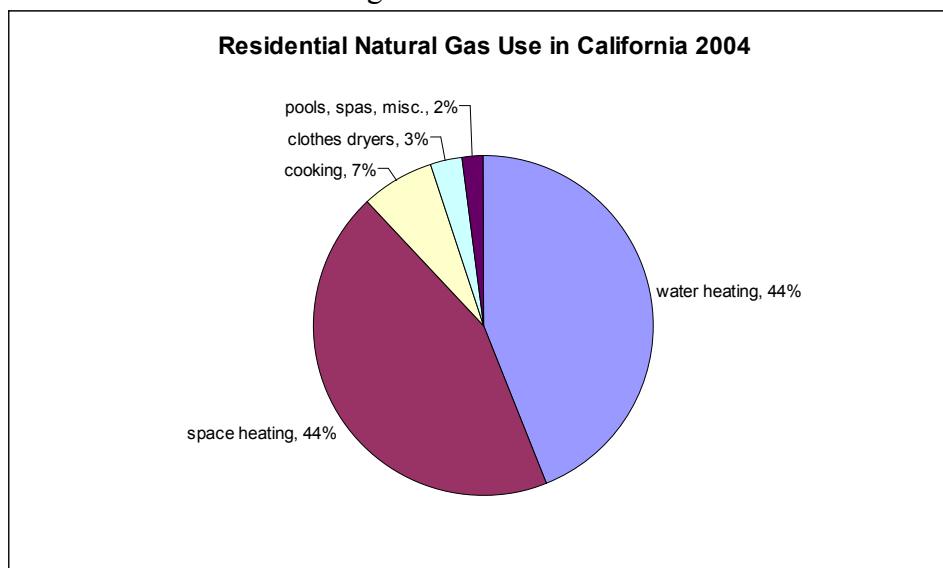
⁸ California Energy Commission, 2005 Integrated Energy Policy Report, November 21, 2005, page 129.

⁹ Source: California Energy Commission, California Energy Demand 2006-2016 Staff Energy Demand Forecast, Revised September 2005, CEC-400-2005-034-SF-ED2.

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The two residential uses that consume the largest percentage of natural gas are space heat and hot water. Natural gas is also used to heat the water for washing machines, dishwashers, and swimming pools. Natural gas used for cooking purposes ranks fourth in terms of residential uses for natural gas.¹⁰



Alternative Energy Sources

Electricity supply reliability depends, in part, on the diversity of energy sources. In 1978, congress passed the Public Utilities Regulatory Policies Act (PURPA). The act defines facilities that use alternative or renewable energy sources as “qualifying facilities.” It provides financial incentives for their installation and requires utilities to sign long-term power purchase contracts with qualifying facilities. The CPUC has adopted contract incentives to assist qualifying facilities.

¹⁰ California Energy Commission. (Adopted November 21, 2005) 2005 Integrated Energy Policy Report, page 127.

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Qualifying facilities built in the SCAG region include wind and solar installations in Riverside and San Bernardino Counties and a number of cogeneration units around the region. Original provisions of PURPA encouraged the construction of biomass-to-energy facilities, which use materials such as agricultural and wood waste as fuel for energy production. However, changes to the law sharply reduced the number of biomass-to-energy facilities in the state and the amount of power provided.

Cogeneration provides the most megawatts of energy from qualifying facilities for Southern California Edison with over 2,000 megawatts under contract. Wind is the second largest source for energy from qualifying facilities with over 1,000 megawatts. Southern California Edison's energy from qualifying facilities is presented below.

Southern California Edison Energy from Qualifying Facilities	
Technology	MegaWatts Under Contract
Cogeneration	2,241
Wind	1,069
Geothermal	950
Solar	379
Biomass	254
Small Hydro	95
Total	4,988
Source: Southern California Edison Company. (31 January 2006). <i>QF Resources: Qualifying Facilities Semi-Annual Status Report to the California Public Utilities Commission.</i>	

Cogeneration / Combined Heat and Power

Emissions stacks are synonymous with fossil fuel burning energy plants. Cogeneration captures a portion of the heat energy lost through the stacks to create power.

Cogeneration means that the useful thermal energy produced as a by-product is captured at the same time electrical power is produced. This practice can increase the efficiency of energy production from approximately 33% to over 70%, with clear environmental benefits.¹¹

There are several national and regional partnerships that promote cogeneration. The U.S. Environmental Protection Agency's (EPA) Combined Heat and Power (CHP) Partnership is "a voluntary program that seeks to reduce the environmental impact of power generation by fostering the use of cogeneration."¹² This partnership is designed to foster cost-effective cogeneration projects throughout the country.

¹¹ Southern California Association of Governments (SCAG). (June 2002). Regional Comprehensive Plan and Guide Energy Chapter Update 2002. Los Angeles: SCAG.

¹² U.S. Environmental Protection Agency. (6 Dec. 2005). Combined Heat and Power Partnership. Accessed December 6, 2005, from <http://www.epa.gov/chp/index.htm>.

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In California and the western United States, there is the Pacific Southwest Combined Heat and Power Initiative. The mission of this initiative is to “coordinate a public/private interaction whose objective is to increase the development and use of cost-effective and environmentally preferred combined cooling, heating and power technologies throughout the Pacific Southwest region, including California, Arizona, Nevada, Hawaii.”¹³ The Initiative works to outreach to the general public and legislative bodies, to increase installed cogeneration capacity in the southwestern United States, to remove utility barriers to cogeneration, to develop state-level policies and regulations that give incentives and preferred treatment for cogeneration systems, technology and cogeneration “packaged-system” development, and to establish interstate collaboration.

There also is the Pacific Region Application Center that assists firms “to locate, design and implement economically viable distributed energy projects that make appropriate use of their recoverable waste heat.”¹⁴ These national and regional initiatives all promote increasing the efficiency of existing power plants and capturing more of the energy being produced at power plants.

Wind

Wind energy in the SCAG region is produced in the San Geronimo Pass near Palm Springs in Riverside County. Other major areas for wind energy facilities in the state are located in the Altamont Pass east of San Francisco and in Tehachapi near Bakersfield.

Geothermal

Southern California Edison has 950 megawatts of geothermal energy under contract. Geothermal energy comes from underground reservoirs of steam, hot water, and hot dry rocks. Hot water or steam extracted from geothermal reservoirs in the Earth's crust is supplied to steam turbines at electric utilities that drive generators to produce electricity.¹⁵ The California Energy Commission's Geothermal Program was created by Assembly Bill 1905 (Bosco) and has been in operation since 1981.¹⁶ The program promotes geothermal research and development of geothermal energy production in California.

Solar

Southern California Edison has 379 megawatts of solar energy under contract. The California Energy Commission has had a Solar Energy and Distributed Generation Grant Program to incentivize the installation of solar energy systems in private residences. The program currently does not have funding in the state budget. While solar energy has started up costs to install, it is a source of readily available, clean, and renewable energy for southern California that will more than pay for itself over a period of years.

¹³ Pacific Southwest Combined Heat and Power Initiative. (n.d.) The Pacific Southwest CHP Initiative. Accessed December 6, 2005, from <http://www.pswchpi.org/index2.aspx>.

¹⁴ Pacific Region Application Center. (n.d.). Mission Statement. Accessed December 6, 2005, from <http://www.chpcenterpr.org/Mission/Index.aspx>.

¹⁵ U.S. Department of Energy. (August 2005). Geothermal Energy. Accessed December 6, 2005, from <http://www.eia.doe.gov/cneaf/solar/renewables/page/geothermal/geothermal.html>.

¹⁶ California Energy Commission. (4 October 2005). Energy Commission Geothermal Program. Accessed December 6, 2005, from <http://www.energy.ca.gov/geothermal/>.

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California has installed more than 130 MW of rooftop solar photovoltaic PV systems since 1981. The Governor proposed a goal to install one million solar roofs in California by 2018, which did not pass the legislature. In response to the 2003 Energy Report and 2004 Energy Report Update, the Governor pursued the goal of a million solar roofs by outlining principles to be used to achieve that goal. The Governor recently signed a law that would promote the installation of PV generation in open spaces above and along 660 miles of open canals and pipelines on the State Water Project AB 515 (Richman), Chapter 368, Statutes of 2005).¹⁷

On December 15, 2005, the California Public Utilities Commission approved an order to increase funding by \$300 million for solar photovoltaic technologies that are currently part of the Self-Generation Incentive Program (SGIP). This funding, together with reduced rebate levels would assure program continuity through 2006. The CPUC intends to adopt a subsequent long-term program to provide incentives for the installation of solar energy technologies in California over the next ten years. The program, called the "California Solar Initiative" (CSI) would respond to a policy proclamation by the Governor favoring solar development and strong interest by the State Legislature in an expanded solar incentives program in California.¹⁸

In addition, on January 12, 2006, the California Public Utilities Commission approved the California Solar Initiative (R.04-03-017), which provides \$2.9 billion in incentives between 2007 and 2017. The California Public Utilities Commission will oversee a \$2.5 billion program for commercial and existing residential customers, funded through revenues and collected from gas and electric utility distribution rates. Furthermore, the California Energy Commission will manage \$350 million targeted for new residential building construction, utilizing funds already allocated to the CEC to foster renewable projects between 2007 and 2011.¹⁹

Biomass / Biofuels

As discussed under qualifying facilities, biofuels and biomass are alternative energy sources that can be developed to reduce the dependence on energy from fossil fuels. The U.S. Department of Energy's Biomass Program lauds biomass and biofuels because biomass use "strengthens rural economies, decreases America's dependence on imported oil, avoids use of MTBE or other highly toxic fuel additives, reduces air and water pollution, and reduces greenhouse gas emissions."²⁰ Nationwide in 2003, biomass was the leading source of renewable energy, accounting for 47% of the renewable energy produced in the United States and 4% of the total energy produced within the U.S.²¹ There are 26 biomass-to-energy plants operating in California, with a total generating

¹⁷ California Energy Commission. (Adopted November 21, 2005) 2005 Integrated Energy Policy Report, page 124.

¹⁸ California Public Utilities Commission, Draft Decision, "Order Instituting Rulemaking Regarding Policies, Procedures and Incentives for Distributed Generation and Distributed Energy Resources." Rulemaking 04-03-017, Filed November 15, 2005.

¹⁹ California Public Utilities Commission, The California Solar Initiative R.04-03-017, http://www.cpuc.ca.gov/static/energy/060112_solarfactsheet.htm, last accessed January 13, 2006.

²⁰ U.S. Department of Energy. (30 Nov. 2005). Biomass Program. Accessed December 6, 2005, from <http://www.eere.energy.gov/biomass/>.

²¹ U.S. Department of Energy. (10 Aug. 2005). Biomass Today. Accessed December 6, 2005, from http://www.eere.energy.gov/biomass/biomass_today.html.

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capacity of 550 MW.²² Southern California Edison has 254 MW of biomass under contract within the SCAG region.

Small Hydroelectric

Small hydroelectric facilities provide 95 megawatts of energy to Southern California Edison under their qualifying facilities contract. Large hydroelectric facilities provide a major source of power in California. These large facilities are operated by the federal government's Bureau of Reclamation and the state government's Department of Water Resources and are located on dams in the state.²³ Power utilities such as Southern California Edison operate the smaller hydroelectric facilities in the state. Hydroelectric projects larger than 30 MW are not considered eligible under the Renewable Portfolio Standard program for Investor Owned Utilities (IOUs). However, most Publicly Owned Utilities (POUs) still count generation from these projects toward their renewable energy targets.²⁴

Conversion Technologies

The concept of conversion technologies is to take waste that would otherwise be discarded into landfills and use it in a productive way to create energy and allow for the conservation of other resources. Besides incineration, other types of conversion technologies include:

- Anaerobic Digestion: Anaerobic digestion is a biological process that produces a gas from organic wastes such as livestock manure, food processing waste, etc.
- Landfill Gas: Landfill gas power plants collect the gasses emitted by landfills and turn them into productive uses.
- Municipal Solid Waste: Municipal solid waste "can be directly combusted in mass burn facilities as a fuel with minimal processing. It can undergo moderate to extensive processing before being directly combusted as refuse-derived fuel."²⁵
- Pyrolysis: Pyrolysis involves the oxygen free decomposition of landfill destined waste using heat or thermal gasification.
- Waste Tire: Waste tire-to-energy facilities produce gypsum for agricultural use to make wallboard, fly ash (33% zinc) for animal feed and use as pigment, and bottom ash (70% iron oxide) to make cement, foundry, and road base.²⁶

Distributed Generation

A closely related approach to energy reliability is distributed generation (DG), also referred to as distributed energy resources (DER), or self-generation. The California Energy Commission defines distributed generation as "...electric generation connected to

²² California Integrated Waste Management Board. (4 Feb. 2004). Biomass to Energy. Accessed December 6, 2005, from <http://www.ciwmb.ca.gov/Organics/Conversion/BioEnergy/>.

²³ California Energy Commission. (22 May 2001). Hydroelectric Power in California. Accessed December 6, 2005, from <http://www.energy.ca.gov/electricity/hydro.html>.

²⁴ California Energy Commission (21 November 2005). 2005 Integrated Energy Policy Report. Adopted November 21, 2005.

²⁵ California Energy Commission. (27 April 2005). Municipal Solid Waste Power Plants. Accessed December 6, 2005, from <http://www.energy.ca.gov/development/biomass/msw.html>.

²⁶ California Energy Commission. (27 April 2005). Waste Tire to Energy. Accessed November 16, 2004, from http://www.energy.ca.gov/development/biomass/waste_tire.html.

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the distribution level of the transmission and distribution grid usually located at or near the intended place of use.”²⁷ Distributed generation can cost-effectively displace or delay the need for new electricity infrastructure.

One aspect of distributed generation is "Self Generation." Self generation refers to systems owned by the customer and installed on their side of the meter to supply power onsite. One example of self generation is the placement of solar panels on a structure to reduce energy costs.

Distributed generation contributes to energy reliability and energy security. Power users who can generate their own power are less dependent on the central grid, and can reduce peak load at times of high demand. Distributed generation users thus are less vulnerable individually to system-wide outages. Furthermore, distributed energy resources reduce the importance of large, central power generating stations that can be a single point of failure.

Depending on the type of technology, distributed energy resources may provide local and regional environmental benefits. This is particularly true of photovoltaic (solar) installations, wind turbines, and fuel cells. Biomass-to-energy facilities also can result in the reduction of environmental impacts relative to other means of organic waste transportation and disposal. Even though microturbines are often fossil-fuel-fired, the latest systems are very low emitting. Several have been placed around the SCAG region in biomass applications (using landfill gas) in projects funded by the SCAQMD.

Distributed generation installations also can provide opportunities to improve resource efficiency through waste heat recovery in the process, described earlier in this chapter, of cogeneration or combined heat and power (CHP). While cogeneration need not necessarily be applied in conjunction with distributed generation, it is integral to the design of systems referred to as micro- or mini-grids or power parks: a local cluster of power generators and users (residential, industrial, or otherwise) with a single connection to the main power grid.

A small portion of the SCAG region's electrical power is currently provided by distributed energy resources. According to the CEC's Distributed Generation Strategic Plan, there are over 500 installations totaling 766 MW of operational distributed generation in Southern California Edison's territory, with another 215 MW proposed.²⁸ The LADWP 2000 Integrated Resource Plan has a goal of meeting 50% of load growth through distributed generation, demand side management and renewable resources.²⁹

The limited use of distributed generation in the SCAG region reflects a number of barriers that have slowed adoption. According to the National Renewable Energy Laboratory, barriers include the following:

²⁷ California Energy Commission, Distributed Generation Strategic Plan, June 2002

²⁸ California Energy Commission, Distributed Generation Strategic Plan, June 2002

²⁹ Los Angeles Department of Water and Power, 2000 Integrated Resource Plan

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- Relatively small projects may face high fees, long approval processes, or burdensome insurance requirements. An example is high backup or standby charges, which a utility collects to cover the cost of providing power when the DG system is not operating. Another is an exit fee, which is levied on customers leaving the grid to compensate the utilities for the stranded cost of generating facilities.
- There is no national consensus on standard interconnection practices, so each project must go through a unique process, pay different charges, and meet different technical and safety standards. This may partly reflect utilities' lack of experience with DG projects, but could also stem from an understandable reluctance to lose part of their customer base.
- Local codes, standards, and environmental regulations that are not structured to recognize the attributes of distributed power³⁰

Since many distributed generation technologies, such as wind and solar, take advantage of essentially free energy sources, the main installation barrier is the capital cost of equipment. A number of state programs have been established to facilitate the installation of distributed and self generation, including Governor Schwarzenegger proposal for a "million solar roofs" program designed to provide 3,000 megawatts of energy by 2018.³¹

Petroleum

California as a state ranks 4th in oil reserves and oil production. California also ranks 1st in gasoline consumption and 2nd in distillate fuel and jet fuel consumption.³² California relies on oil produced within the state, Alaska, and foreign nations to supply its refineries and produce the petroleum that is used in automobiles and for other purposes. The percentage of oil that is imported from foreign nations has increased dramatically in the past twenty years. In 2004, the total receipts to refineries of roughly 655 million barrels came from in-state oil production (42%), combined with oil from Alaska (22%), and foreign sources (36%).³³ As shown in the figure below, foreign sources of oil have surpassed Alaskan supplies and are reaching California supply levels.

³⁰ Source: U.S. Dept. of Energy, Energy Efficiency and Renewable Energy.

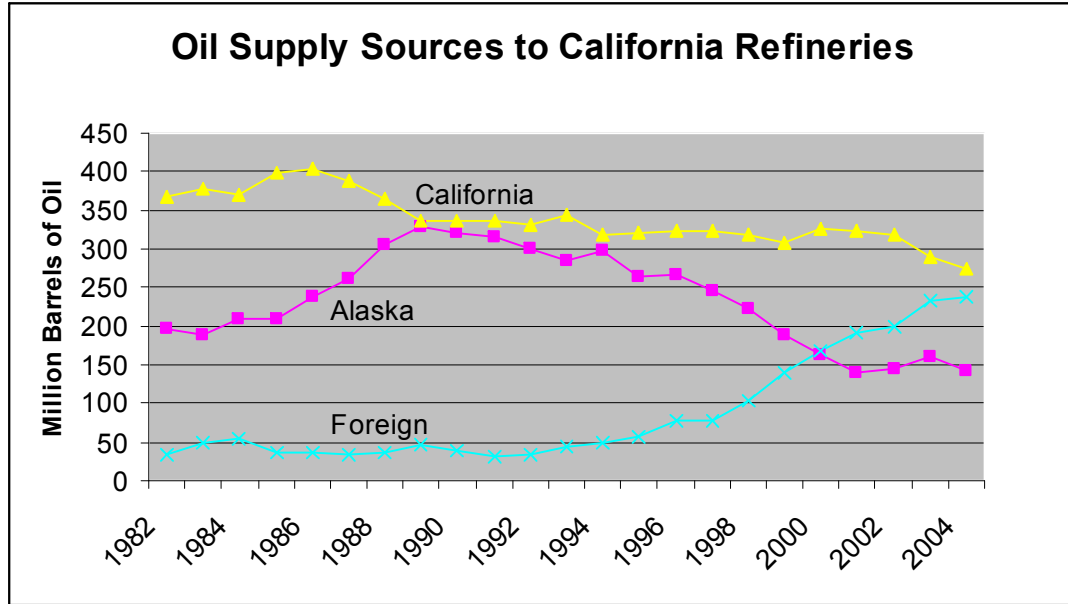
http://www.eere.energy.gov/de/overcoming_obstacles.html, accessed December 13, 2005

³¹ California Senate Bill SB1 (2005 Session) as amended, accessed June 14, 2005.

³² United States Department of Energy, Petroleum Profile, California; August 2005. <http://tonto.eia.doe.gov/oog/info/state/ca.html>, accessed December 13, 2005

³³ California Energy Commission, Oil and Petroleum in California, October 20, 2005, <http://www.energy.ca.gov/oil/>, accessed December 13, 2005.

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Source: California Energy Commission, Oil Supply Sources to California Refineries, March 9, 2005, http://www.energy.ca.gov/oil/statistics/crude_oil_receipts.html, accessed December 15, 2005.

Travel Fuel Consumption

The California Department of Transportation reports that vehicles in the SCAG region consumed over 21.5 million gallons of fuel per day in 2000. The 414.5 million vehicle miles traveled daily in 2000 represented 47% of all vehicle miles traveled in the state.

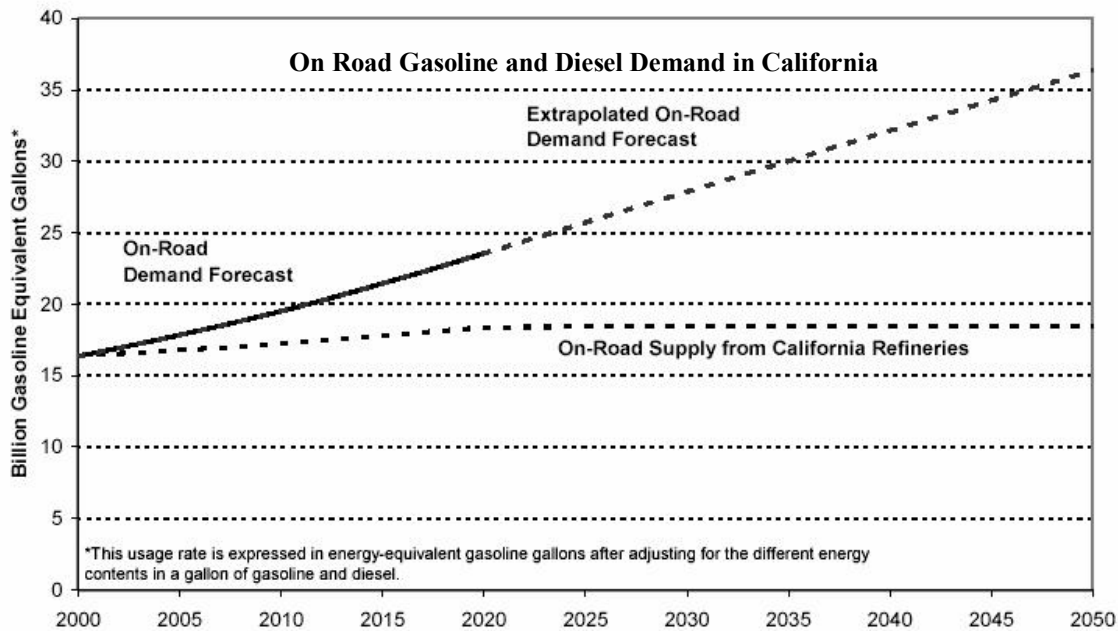
Vehicle Fuel Consumption (VFC) and Vehicle Miles Traveled (VMT), 2000		
County/Region	VFC (Gallons/Day)	VMT/Day
Imperial	274,466	4,692,770
Los Angeles	11,579,222	224,343,633
Orange	3,735,060	73,383,463
Riverside	2,241,512	42,984,468
San Bernardino	2,773,932	50,377,970
Ventura	933,197	18,687,142
SCAG Region	21,537,389	414,469,447
California	46,121,370	880,468,493
Source: California Department of Transportation, Division of Transportation System Information. (November 2003). <i>California Motor Vehicle Stock, Travel and Fuel Forecast</i> .		

However, California's refining capacity has not been able to keep up with the demand for transportation fuels.³⁴ Because of that, the gasoline market is increasingly unstable as

³⁴ California Energy Commission/California Air Resources Board: Reducing California's Petroleum Dependence, August 14, 2003 Final, Adopted Joint Agency AB 2076 Report, publication # 600-03-006F. Accessed December 15, 2005.

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refinery accidents or scheduled maintenance create shortages and price fluctuations. The below figure indicates the demand forecast to 2050:³⁵



The California Energy Commission and the California Air Resources Board are directed by law (2000 AB 2075) to develop and adopt recommendations for reducing dependence on petroleum. A performance based goal is to reduce petroleum demand to 15% below 2003 demand. The options include:³⁶

- Near-Term Options (could be fully implemented by 2010)
 - Use more fuel efficient replacement tires with proper inflation
 - Improve fuel economy in government fleets
 - Improve private vehicle maintenance
- Mid-Term Options (could be fully implemented in the 2010-2020 time frame)
 - Double fuel efficiency of current model light duty vehicles to 40 miles/gallon
 - Use natural gas-derived Fischer-Tropsch fuel as a 33% blending agent in diesel
- Long-Term Options
 - Introduce fuel cell light duty vehicles in 2012, increasing to 10% of new vehicle sales by 2020, and 20% by 2030.

³⁵ California Energy Commission (CEC)/California Air Resources Board: Reducing California's Petroleum Dependence, August 14, 2003 Final, Adopted Joint Agency AB 2076 Report, publication # 600-03-006F. Accessed December 15, 2005.

³⁶ CEC/Caliornia Air Resources Board: Reducing California's Petroleum Dependence, August 14, 2003 Final, Adopted Joint Agency AB 2076 Report, publication # 600-03-006F. Accessed December 15, 2005.

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Recommendations include:³⁷

1. The Governor and Legislature should adopt the recommended statewide goal of reducing demand for on-road gasoline and diesel to 15% below the 2003 demand level by 2020 and maintaining that level for the foreseeable future.
2. The Governor and Legislature should work with the California delegation and other states to establish national fuel economy standards that double the fuel efficiency of new cars, light trucks and SUVs.
3. The Governor and Legislature should establish a goal to increase the use of non-petroleum fuels to 20% of on-road fuel consumption by 2020 and 30% by 2030.

Building Energy Efficiency

Interest in “green buildings” has been growing for some time, as the impacts of buildings on the environment have come into clearer focus and a broader concern has developed regarding environmental sustainability. “Green building” standards go well beyond energy efficiency, involving usage of renewable resources and reduced waste generation and water usage, among other things. Such standards can reduce local environmental impacts, regional air pollutant emissions, and even global greenhouse gas emissions. A 2003 study conducted for the California Sustainable Building Task Force found that the 20-year value of energy savings in green buildings was more than three times the value of emissions, water and waste savings combined.³⁸

The following sections summarize several important building energy efficiency standards and programs. The study mentioned in the previous paragraph contains a more comprehensive discussion of building energy efficiency programs at the international, national and state levels.

Leadership in Energy and Environmental Design (LEED)

During the 1990’s, the non-profit U.S. Green Building Council developed the LEED Green Building Rating System for commercial buildings. The system awards points for various design features of a building, resulting in a rating ranging from Certified at the low end, through Silver and Gold to Platinum at the high end. The points are awarded for six categories, such as Energy and Atmosphere, Water Efficiency, and Indoor Environmental Quality. The Energy criteria include the following prerequisites:

- A requirement for building commissioning (a process to verify that fundamental building systems are installed and operating as intended); and
- A minimum level of energy efficiency for the building and its systems, based on the more stringent of the local energy code or American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)³⁹

³⁷ CEC/California Air Resources Board: Reducing California’s Petroleum Dependence, August 14, 2003 Final, Adopted Joint Agency AB 2076 Report, publication # 600-03-006F. Accessed December 15, 2005.

³⁸ G. Kats, et al., *The Costs and Financial Benefits of Green Buildings: A Report to California’s Sustainable Building Task Force* (October 2003) p. ix, Table ES-1 < https://www.usgbc.org/Docs/Resources/CA_report_GBbenefits.pdf>. Accessed December 15, 2005.

³⁹ American Society of Heating, Refrigerating, and Air-Conditioning Engineers, <<http://www.ashrae.org/>>.

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Standard 90.1-1999. (In California, the state building energy efficiency standards are more stringent.)

Project applicants can go on to rate additional LEED points by taking the following steps:

- Reducing design energy cost beyond the minimum;
- Supplying a portion of building energy from onsite renewable sources;
- Conducting additional commissioning;
- Measuring and verifying continuing system performance through installation of specific meters; and
- Supplying half of the building's energy from renewable sources via contract.⁴⁰

The LEED rating system has become one of the most popular and influential in the country, in part due to the participatory and professional nature of the Green Building Council.⁴¹ In April 2004, the program marked its fourth year and 100th certified building.⁴² According to the LEED web site, there are 14 LEED certified buildings in California.⁴³

The table below lists several LEED certified and registered projects in the SCAG region. Registered projects are those intending to seek LEED certification.

LEED Projects in the SCAG Region				
Organization	Building	City	Year	Status
Southern California Gas Company	Energy Resource Center	Downey	1995	Version 1 Certified
Ford Motor Company	Premier Automotive Group North American Headquarters	Irvine	2001	Version 2 Certified
Pomona College	Biology Building	Claremont	2002	Registered
Audubon Society	Audubon Center at Debs Park	East Los Angeles	2003	Version 2 Platinum
City of Los Angeles	Lake View Terrace Library	Los Angeles	2003	Registered
City of Santa Monica	Santa Monica Main Library	Santa Monica	2003	Registered
Inland Empire Utilities Agency	Inland Empire Utilities Agency Headquarters	Chino	2003	Version 2 Platinum
Natural Resources Defense Council	Santa Monica Office	Santa Monica	2003	Registered (on target for Platinum)
Riverside Public Utilities	Casa Blanca Energy Demonstration & Customer Service Center	Riverside	2003	Registered (on target for Silver)
Toyota Motor Sales	South Campus Office Development	Torrance	2003	Version 2 Gold

⁴⁰ All energy prerequisites and credits (additional steps) from *LEED Green Building Rating System For New Construction & Major Renovations*, version 2.1 (LEED-NC, November 2002,) 21-32

⁴¹ G. Kats et al. Op cit., p. 5.

⁴² U.S. Green Building Council press release 2004 April 14. USGBC Announces 100th LEED® Certified Project. <http://www.usgbc.org/News/pressreleases_details.asp?ID=739>. Accessed December 15, 2005.

⁴³ See https://www.usgbc.org/LEED/Project/project_list.asp, accessed December 15, 2005.

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Loisos + Ubbelohde	Art Center College of Design South Campus	Pasadena	2003	Registered
City of Los Angeles	Boyle Heights Youth Technology & Recreation Center	Los Angeles	2003	Registered
March Air Reserve Base	C-17 Alter Squadron Operations Facility and Life Support Facility	Riverside	2003	Registered
Newmatic Engineering, Inc.	Newmatic Engineering Inc.	Irvine	2004	Registered
Orange County Integrated Waste Management Department	Bowerman Landfill Operations Building Addition	Irvine	2004	Registered
RAND	RAND Corporate Headquarters	Santa Monica	2004	Registered (on target for Silver)
State of California Department of Transportation	Caltrans District 7 Building Headquarters	Los Angeles	2004	Registered
Santa Monica	Public Safety Building	Santa Monica	2004	Version 2 Silver
The Gas Company	Murrieta Operating Base	Murrieta	2004	Version 2 Certified
Warner Bros. Entertainment Inc.	Warner Bros. Entertainment Inc., Bldg. 151	Burbank	2004	Version 1 Silver
South Park RPO, LLC	11 th and Grand	Los Angeles	2004	Registered
Tricom	Yorkshire Development	Pasadena	2004	Version 2 Silver
British Petroleum	British Petroleum Carson Business Unit	Carson	2004	Registered
City of Burbank	Burbank Development and Community Services Building	Burbank	2004	Registered
City of Calabasas	City Hall	Calabasas	2004	Registered
City of Glendale	Glendale Water and Power Administration Building	Glendale	2004	Registered
Fullerton Arboretum Center	Fullerton Arboretum Interpretive Center	Fullerton	2005	Registered
Sempra Energy	Yukon Base Facility	Hawthorne	2005	Version 2 Silver
Community Corporation of Santa Monica	Colorado Court	Santa Monica	2005	Version 2 Gold
J. Paul Getty Trust	The Getty Center	Los Angeles	2005	Version 2 Certified
LPA, Inc.	LPA Irvine Headquarters	Irvine	2005	Version 1 Certified
MMA Properties	45 Eureka Street	Pasadena	2005	Registered
Aquarium of the Pacific	Aquarium of the Pacific - Classroom & Watersheds Exhibit	Long Beach	2005	Registered
U.S. Navy	Navy's Energy % Sustainable Demonstration Facility	Port Hueneme	2005	Version 2 Gold

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As of April 2004, the LEED list of registered projects included 204 building projects statewide.⁴⁴ Nationally, three percent of all new construction projects have registered intent to seek LEED certification.⁴⁵

It is possible to reach LEED levels without doing more than just minimally complying with the Building Energy Efficiency Standards. However, projects can earn two additional LEED points by reducing energy usage 20% more than required by the Building Energy Efficiency Standards.

Energy Star Homes

Energy Star is “a government-backed program helping businesses and individuals protect the environment through superior energy efficiency.”⁴⁶ The Energy Star Homes program results in energy-efficient residential construction through such measures as high-performance windows, tested and field-verified duct sealing, and properly sized and installed air conditioning, as well as higher-efficiency heating, air conditioning and water heating equipment.

California homes built to qualify for the Energy Star Homes program are 15% more efficient than the state Building Energy Efficiency Standards. Energy Star also operates programs that promote energy-efficient appliances. California’s investor-owned utilities offer financial assistance and marketing assistance to builders who build to California Energy Star Homes Program requirements, and also provide rebates on many types of Energy Star appliances.

California Building Energy Efficiency Standards

As mentioned above, California established statewide building energy efficiency standards following legislative action. The legislation required the standards to:

- be cost-effective,
- be based on the building life cycle, and to
- include both prescriptive and performance-based approaches.⁴⁷

California's building efficiency standards (along with those for energy efficient appliances) have saved more than \$56 billion in electricity and natural gas costs since 1978. It is estimated the standards will save an additional \$23 billion by 2013.⁴⁸

The standards have been periodically updated as technology and design have evolved. Generally, the standards are updated every three years. As a result of AB 970, passed in the fall of 2000 in response to the state’s electricity crisis, an emergency update of the Standards went into effect in June 2001. The Commission then initiated an immediate

⁴⁴ See https://www.usgbc.org/LEED/Project/project_list_registered.asp, accessed April 2004.

⁴⁵ U.S. Green Building Council, et al. Making the Business Case for High Performance Green Buildings, https://www.usgbc.org/Docs/Member_Resource_Docs/makingthebusinesscase.pdf, accessed April 2004.

⁴⁶ See <http://www.energystar.gov/>.

⁴⁷ California Energy Commission. Initial Study/Proposed Negative Declaration for the 2005 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Staff Report, September 2003, P400-03-018, p. 7.

⁴⁸ California Energy Commission. Title 24, Part 6 website, <http://www.energy.ca.gov/title24/>. Accessed December 16, 2005.

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follow-on proceeding to consider and adopt updated Standards that could not be completed during the emergency proceeding. The 2005 Building Energy Efficiency Standards were adopted in November 2003, took effect October 1, 2005.

Title 24 of the California Code of Regulations comprises the state Building Standards Code. Part 6 of Title 24 is the California Energy Code, which includes the building energy efficiency standards. The standards⁴⁹ include provisions applicable to all buildings, residential and non-residential, which describe requirements for documentation and certificates that the building meets the standards. These provisions include mandatory requirements for efficiency and design of the following types of systems, equipment, and appliances:

- Air conditioning systems
- Heat pumps
- Water chillers
- Gas- and oil-fired boilers
- Cooling equipment
- Water heaters and equipment
- Pool and spa heaters and equipment
- Gas-fired equipment including furnaces and stoves/ovens
- Windows and exterior doors
- Joints and other building structure openings (“envelope”)
- Insulation and cool roofs
- Lighting control devices.

The standards include additional mandatory requirements for space conditioning (cooling and heating), water heating, and indoor and outdoor lighting systems and equipment in non-residential, high-rise residential, and hotel or motel buildings.

Mandatory requirements for low-rise residential buildings cover indoor and outdoor lighting, fireplaces, space cooling and heating equipment (including ducts and fans), and insulation of the structure, foundation, and water piping.

In addition to the mandatory requirements, the Standards call for further energy efficiency that can be provided through a choice between performance and prescriptive compliance approaches. (Separate sections apply to low-rise residential and to non-residential, high-rise residential, and hotel or motel buildings.) In buildings designed for mixed use (e.g., commercial and residential), each section must meet the standards applicable to that type of occupancy.⁵⁰

The performance approach provides for the calculation of an energy budget for each building and allows flexibility in building systems and features to meet the budget. The energy budget addresses space-conditioning (cooling and heating), lighting, and water heating. Compliance with the budget is determined by the use of a CEC-approved computer software energy model. The alternative prescriptive standards require demonstrating compliance with specific minimum efficiency for components of the building such as building envelope insulation R-values, fenestration (areas, U-factor and solar heat gain coefficients of windows and doors) and heating and cooling, water heating

⁴⁹ California Energy Commission, 2005 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, P400-03-001F, Effective Date October 1, 2005.

⁵⁰ California Energy Commission, 2005 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, P400-03-001F, Effective Date October 1, 2005, Section 100(f).

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and lighting system design requirements. These requirements vary depending on the building's location in the state's 16 climate zones.

The 2005 standards that became effective statewide October 1, 2005, include the following major changes:

- Updated energy budgets that recognize the time dependence of energy usage by season and time of day.
- Incorporation of new federal appliance standards and other advances in technology emerging from the state's Public Interest Energy Research program.
- Incorporation of new state standards for outdoor lighting and for indoor and outdoor signs.
- Changes to improve the quality of construction and verification of reliable energy savings.

Community Energy Efficiency Program

In 1999, the Building Industry Institute (BII), the training and education arm of the California Building Industry Association, worked with an industry and government advisory group to develop the Community Energy Efficiency Program for local governments. The concept is for local governments to offer a range of incentives to motivate builders to improve the energy efficiency of new home construction in their community by 15% compared to Title 24.

Forty-five SCAG member cities and an additional seven non-member cities are currently participants in this program. There are over 70 participants statewide. Incentives offered by participating jurisdictions include expedited review of building plans, permit fee reduction, and public recognition of the builder for their efforts.⁵¹ The hallmark of the program is third-party field verification of the quality of installation of the energy efficiency measures. By providing third-party field verification, the program is particularly helpful to local governments, who can be assured that the energy efficiency measures are installed properly without intensive site inspections by local building department staffs.

Collaborative for High Performance Schools

New school facilities are much needed throughout the state. This California non-profit group, known as Collaborative for High Performance Schools (CHPS), provides best practices and criteria for the construction of schools so as to create "environments that are not only energy efficient, but also healthy, comfortable, well lit and contain the amenities needed for a quality education."⁵² CHPS schools provide more natural daylight and a healthier environment for students, teachers, and staff, and are beginning to reduce school district expenditures on energy, which according to CHPS exceed the combined costs of supplies and books.

⁵¹ See the Building Industry Institute's website at <http://www.thebii.org/lgp.asp>, last accessed January 13, 2006.

⁵² Collaborative for High Performance Schools, <http://www.chps.net/overview/index.htm>, last accessed September 7, 2005.

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California Governor's Sustainable Building Goal

On August 2, 2000, California Governor Gray Davis signed Executive Order D-16-00, "to site, design, deconstruct, construct, renovate, operate, and maintain state buildings that are models of energy, water, and materials efficiency; while providing healthy, productive and comfortable indoor environments and long-term benefits to Californians."⁵³ New state buildings, such as the Department of General Services' East End Complex Block 225 in Sacramento, have been built to sustainable standards as a result. The California Integrated Waste Management Board maintains a website that provides further information and resources for green building design and construction.⁵⁴

Costs and Benefits of Building Energy Efficiency Standards

Cost is a main consideration when undertaking improvements to building energy efficiency. It may cost more to provide energy-efficient building components and systems. Initial costs can be a hurdle even when the installed systems will save money over the life of the building. Energy efficiency measures can reduce initial costs, for example, by reducing the need for over-sized air conditioners to keep buildings comfortable. (Undertaking a more comprehensive design approach to building sustainability can also save initial costs through reuse of building materials and other means).

Probably the most comprehensive and persuasive study of the value of green building savings is the 2003 report to California's Sustainable Building Task Force. In the words of the report:

*While the environmental and human health benefits of green building have been widely recognized, this comprehensive report confirms that minimal increases in upfront costs of about 2% to support green design would, on average, result in life cycle savings of 20% of total construction costs -- more than ten times the initial investment. For example, an initial upfront investment of up to \$100,000 to incorporate green building features into a \$5 million project would result in a savings of \$1 million in today's dollars over the life of the building.*⁵⁵

The Initial Study/Proposed Negative Declaration for the 2005 Building Energy Efficiency Standards prepared by the California Energy Commission found overall energy and environmental benefits from the standards update.⁵⁶ Annual cumulative statewide energy savings from implementation of the standards were estimated at over 600 GWh of electricity and 10 million therms of natural gas, along with a 181-MW drop in peak demand. Statewide total emissions reductions from application of the 2005 standards were estimated at 42 tons/year of NO_x, 3 tons/year of PM₁₀, and 8 tons/year of CO.⁵⁷

⁵³ Executive Order D-16-00 by the Governor of the State of California. August 2, 2000.

⁵⁴ See the California Integrated Waste Management Board's Green Building webpage at <http://www.ciwmb.ca.gov/greenbuilding/Basics.htm>, last accessed January 13, 2006.

⁵⁵ Greg Kats, Capital E, The Costs and Financial Benefits of Green Buildings, A Report to California's Sustainable Building Task Force, October 2003, <http://www.ciwmb.ca.gov/greenbuilding/Design/CostBenefit/Report.pdf>, last accessed December 15, 2005.

⁵⁶ California Energy Commission—Staff Report, *Initial Study/Proposed Negative Declaration for the 2005 Building Energy Efficiency Standards for Residential and Non-residential Buildings*, (September 2003) P400-03-018, Section VII, Cumulative Effects.

⁵⁷ The report points out that some space cooling is natural-gas-fired, which may cause localized emissions in some air basins. However, the CEC estimates that the contribution from gas cooling would be no more than 0.001% over current emission levels, and

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Potential Savings in the SCAG Region

The SCAG region will receive a share of the foregoing benefits from application of the state 2005 energy efficiency standards. For example, the SCAG region consumes about 45% of statewide total electricity,⁵⁸ and can be expected to enjoy a similar share of energy savings benefits and emissions benefits (with some differences depending on the location of power generation).

The region will receive further energy and emissions savings and benefits from local adoption of standards beyond Title 24. If this step were taken regionwide, CEC estimates show that the SCAG region could experience a further reduction in electricity demand amounting to about 199 GWh/year and for natural gas amounting to about 2.9 million therms per year, as well as a 50-MW reduction in peak power demand. While these savings are small in percentage terms, the related emissions savings could be significant. According to CEC estimates, with local adoption of ordinances going beyond Title 24, the region could experience a further decrease of 51 tons/year of NO_x, 7 tons/year of PM₁₀, and 25 tons/year of CO.⁵⁹ Emissions of the greenhouse gas CO₂ would also be reduced.

Compared to other types of emission reduction measures, energy efficiency measures can be a low-cost option – even no cost, as in the case of behavior changes. Energy efficiency measures can be most cost-effective in combination with integrated building design efforts that allow synergies between systems and the structure itself.

Locally Adopted Energy Standards

The State Building Energy Efficiency Standards provide that local jurisdictions may adopt building energy standards as long as the resulting buildings will not use more energy than under the state standards. To ensure this, a city or county in the SCAG region may choose to adopt an ordinance requiring new or modified construction to go beyond the state standards by a certain percentage. Any city or county could modify the target percentages based on local needs and climate conditions.

Demand Response Programs

Utilities such as Southern California Edison offer a variety of Demand Response Programs to help qualifying commercial and residential customers reduce their energy usage during peak times. These programs include:⁶⁰

- Summer Discount Plan
- California Demand Reserves Partnership (Cal-DRP)
- I-6 Large Power Interruptible Program
- Base Interruptible Program (TOU-BIP)
- Demand Bidding Program
- Critical Peak Pricing
- SCE EnergySmart ThermostatSM Program

would be “dwarfed” by the overall emission reductions from the standards. Individual air districts can also restrict the use of gas-fired cooling without conflicting with the state standards.

⁵⁸ Southern California Association of Governments. *Regional Comprehensive Plan and Guide, Energy Chapter Update 2002*, p. 11.

⁵⁹ R. Hudler, California Energy Commission, personal communication, May 2004. Unlike the statewide estimates for adoption of the 2005 standards, these estimates include emissions from natural gas combustion in power plants in addition to emissions from onsite usage.

⁶⁰ <http://www.sce.com/RebatesandSavings/LargeBusiness/DemandResponse/Default.htm>

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- Scheduled Load Reduction Program
- The GoodWatts Program
- Agricultural and Pumping Interruptible Service Program
- Optional Binding Mandatory Curtailment Program

Community Choice Aggregation

Community Choice Aggregation (CCA), as defined by AB 117, permits any city, county or city and county to aggregate the electric loads of residents, businesses and municipal facilities to facilitate the purchase and sale of electrical energy.⁶¹ CCA involves communities joining together to purchase energy in bulk, thus receiving a better price on their energy purchase than if they were to purchase the energy individually.

Future Energy Demand

Strong population and economic growth continue to be forecasted for the SCAG region, meaning that energy demand will likely continue to increase as well. SCAG forecasts that the region will add over 6 million people, 2 million households, and 3 million jobs between 2000 and 2030. These people, households, and jobs will place new demands on energy generation and distribution.

Despite the inevitable demands of growth on the region's energy supplies, little energy forecasting is formally conducted. Processes that formerly occurred at the state level, particularly for electricity demand forecasting, are no longer conducted in a restructured California market. Municipal utilities conduct their own planning processes, but do not coordinate their forecasts with each other or with those of the private utilities. There is no longer a coordinated process for planning maintenance on power generation facilities, creating a higher risk of outages even when demand is typically low.

At one time, state agencies conducted integrated resource planning (IRP), a process that "integrat[es] a broader range of technological options, including technologies for energy efficiency and load control on the 'demand-side', as well as decentralized and non-utility generating sources, into the mix of potential resources. Also, it means integrating a broader range of cost components, including environmental and other social costs, into the evaluation and selection of potential technical resources."⁶²

Energy infrastructure planning takes time and therefore should be the subject of well-structured long-range planning efforts. As the energy grid evolves, former divisions between transportation energy, natural gas, and electricity may begin to fade away. In addition, land use decisions continue to determine the regional energy demands to heat and cool residences and to travel to and from work.

⁶¹ Local Government Commission. (n.d.) Community Choice Aggregation. Accessed November 19, 2004, from http://www.lgc.org/cca/what_is_cca.html.

⁶² United Nations Environment Programme Collaborating Center on Energy and Environment, "Tools and Methods for Integrated Resource Planning," Noel N. Swisher, Gilberto de Martino Jannuzzi, and Robert Y. Redlinger, November 1997, p. 17, <http://uneprisoe.org/IRPManual/IRPmanual.pdf>, last accessed September 7, 2005.

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Through its Energy Resource Investment Plan the California Power Authority is taking steps to resurrect the IRP process. As a living document, both the Plan's strategies and the anticipated specific investment activities will be adjusted in response to market circumstances and consultations with other energy agencies. In its 2003-2004 update, the plan lays out an investment strategy that emphasizes the following commitments:

- Readiness to "step-in" to finance and/or own new power plants that must be built or completed to ensure power reliability or power supply in California, when private companies do not build or cannot finance, and the need for such action is the consensus view of the responsible State agencies.
- Advancing our Demand Reserves Partnership program through revised institutional and contractual arrangements.
- Increasing the contribution of renewable energy resources to the power portfolio through financing and aggregation services to load-serving entities (LSEs) Statewide (investor-owned utilities [IOUs], publicly-owned utilities, and energy service providers).
- Facilitating investments in efficiency and distributed generation on public facilities across the State.⁶³

Electricity

Given the recent history of California's electricity market, concern has focused on whether short-term imbalances of power supply and demand will continue. Whatever the causes of the shortages and blackouts, most experts seem to agree that statewide energy reserves continue to be too slim.

The California Energy Commission has estimated electricity consumption for the SCAG region to 2016. Commercial businesses will continue to be the sector using the greatest amount of electricity in the forecast years of 2010 and 2016. All other sectors will increase their consumption of electricity with the exception of the mining sector, which will see a decrease in electricity. The years 2010 and 2016 include estimates of the transportation, communication, and utilities sector (TCU) and streetlighting.

Forecast Electricity Demand by Sector (In Millions of Therms)									
Year	Region	Sector							Total Consumption
		Resid'l	Comm'l	Industry	Mining	Agricult	TCU	Streetlight	
2010	SCAG	42,096	52,155	24,581	3,646	5,409	6,401	1,045	135,333
2010	California	94,134	106,530	47,034	6,560	23,368	14,285	1,804	293,715
2016	SCAG	45,836	54,334	25,160	3,909	5,981	6,628	1,055	142,903
2016	California	104,128	111,624	46,250	7,088	24,571	14,879	1,857	313,397

Source: California Energy Commission. (September 2005). *California Energy Demand 2006-2016 Forecast*.

Natural Gas

The California Energy Commission's estimates of natural gas consumption show a 0.1 percent decrease in consumption from 2004 to 2016. The industrial, mining, agricultural,

⁶³ California Consumer Power and Conservation Financing Authority, Energy Resource Investment Plan 2003-2004, June 27, 2003, http://www.documents.dgs.ca.gov/CPA/ERIP/ERIP_2003_FINAL_DOCUMENT_062703.pdf, last accessed September 7, 2005.

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and other sectors are forecast to experience either no change or a decrease in the amount of natural gas consumed between 2004 and 2016.⁶⁴ The other two sectors are forecast to experience modest increases in natural gas consumption.

Forecast Natural Gas Demand by Sector (In Millions of Therms)								
Year	Region	Sector						Total Consumption
		Resid'l	Comm'l	Industry	Mining	Agricult	Other	
2010	SCAG	2,802	1,046	1,612	2,284	103	82	7,928
2010	California	5,373	2,074	3,380	2,519	197	149	13,692
2016	SCAG	2,924	1,063	1,573	2,178	103	82	7,924
2016	California	5,667	2,090	3,601	2,388	197	149	14,091
Source: California Energy Commission. (September 2005). <i>California Energy Demand 2006-2016 Forecast</i> .								

Hydrogen

California is developing the infrastructure for a “hydrogen highway,” a three phase strategy, with the first phase to be completed by 2010, and future phases as needs dictate.⁶⁵ Governor Schwarzenegger opened Station #1 of the California Hydrogen Highway on April 20, 2004. There are 13 existing hydrogen fueling stations in the state, with 17 more planned. By 2010, the plan is to have 170 fueling stations, or a station every 20 miles along major federal and state highways across the state. Hydrogen-powered fuel cells may be part of the energy solution to reduce California’s reliance on fossil fuels.

Travel Fuel Consumption

The California Department of Transportation forecasts that the daily gallons of vehicle fuel consumed and the daily vehicle miles traveled will increase across the state by 2025. The SCAG region’s percentage of the total vehicle fuel consumed and vehicle miles traveled will remain consistent with the year 2000, with 47% of the state’s fuel consumed and miles traveled taking place in the SCAG region. The number of gallons a day that will be consumed by vehicles will increase 61% over 2000 levels and the vehicle miles traveled will increase 58% over 2000 levels.

Vehicle Fuel Consumption (VFC) and Vehicle Miles Traveled (VMT), 2025		
County/Region	VFC (Gallons/Day)	VMT/Day
Imperial	643,318	11,460,679
Los Angeles	16,687,370	318,343,858
Orange	5,452,405	105,686,474
Riverside	5,025,981	91,580,351
San Bernardino	5,451,668	98,266,022
Ventura	1,502,315	29,465,389
SCAG Region	34,763,058	654,802,773
California	74,719,778	1,406,169,605

⁶⁴ The “Other” sector refers to water pumping, transportation, communication, and utilities.

⁶⁵ California Hydrogen Highway Network, CA H2 Net Blueprint Plan Fact Sheet, <http://www.hydrogenhighway.ca.gov/media/blueprintfacts.pdf>, last accessed September 7, 2005.

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Source: California Department of Transportation, Division of Transportation System Information. (November 2003). <i>California Motor Vehicle Stock, Travel and Fuel Forecast.</i>
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PRELIMINARY OUTCOMES

- Per capita electricity consumption
Is the per capita electricity consumption increasing or decreasing? The region's goal should be to reduce per capita consumption from non-renewable resources.
- Per capita travel fuel consumption
Is the per capita travel fuel consumption increasing or decreasing. The region's goal should be to reduce travel fuel consumption from non-renewable resources.
- Energy imports
 - Electricity
Is the region importing more or less energy from out of state and out of the country?
 - Travel fuel
Is the region importing more or less travel fuel from out of state and out of the country?
- Percentage share of renewable energy in energy mix
Is the percentage share of renewable energy increasing?
- LEED-certified buildings
Are the number of LEED-certified buildings increasing?
- Automobile fuel efficiency
Are automobiles becoming more fuel efficient?
- Percentage share of alternative fuel vehicles/hybrid vehicles
Is the percentage share of alternative fuel/hybrid vehicles increasing?

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